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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/826,784	LIN, KEN K.	
	Examiner	Art Unit	
	David N. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☒ Claim(s) *13 and 15-17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *16 April 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20050929*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This is the First Action on the Merits for US Patent Application 10/826,784. Currently, claims 1-24 are pending.

Drawings

2. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the examiner does not accept the changes, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: aside from a non-limiting, general statement that the invention "is described in terms of applications compatible with computer systems" manufactured by the Assignee, the specification appears entirely to be directed to a

method. Therefore, claims 18-21, reciting a product, do not have adequate support in the specification.

Claim Objections

4. Claims 13 and 15-17 are objected to for not being in proper Markush format. The statement of claim 13 of "calculating one or more parameters", the statement of claim 15 of selecting "at least one of the plurality of metrics", the statement of claim 16 of "computing at least one metric", and the statement of claim 17 of "analyzing...at least one additional parameter" precludes the interpretation of these claims as being necessary to examine all the members of the claim on the merits. In other words, the phrasing "one or more" and "at least one" will cause these claims to be considered disjunctive recitations of metrics, not conjunctive. It is suggested that, for example, claim 13 be amended to recite, "...calculation of parameters selected from the group..." in order to properly interpret this claim as necessarily covering every recited limitation.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 18-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. In claim 18, the term "machine" is not considered specific enough to tangibly link a computer-readable medium with a computer-executable program in statutory form. It is suggested that the word "machine"

be replaced with the word "computer", or the word "program" be replaced with the phrase "computer program". See MPEP 2106.01.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-3 and 18-19 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by US Patent 5,847,772 A (Wells). Wells teaches a video encoder. Regarding claim 1, Wells teaches that an inverse telecine circuit "operative to detect the 3:2 pulldown pattern phase and to drop any repeat fields" (column 2: lines 64-66) was known in the art. Regarding claim 18, the invention of Wells, including an inverse telecine circuit, may be implemented in software (column 11: line 57–column 12: line 4).

Regarding claims 2 and 19, as shown in figure 1A of Wells, inverse telecine circuit 18 outputs to video encoder 20. The encoder may set a repeat_first_field flag in accordance with the inverse telecine (column 3: line 4). Regarding claim 3, the encoder may be an MPEG-2 encoder (column 3: line 3).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 5-9, 11, 13, and 20-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wells in view of US Patent Application Publication 2004/0130619 A1 (Lin). Wells uses an odd-tap filter on even fields and an even-tap filter on odd fields to assist in accurate deinterlacing and inverse telecine by finding repeated fields (column 9: lines 26-53) or producing interpolated fields (column 9: line 54–column 10: line 18). However, Wells does not discuss in any detail determining interruption of a pull-down pattern.

Lin teaches a 3:2 pulldown detection method. Regarding claims 5 and 20, Lin is concerned with finding "bad editing points", in which a single frame is produced from fields of different scenes, producing a double-exposed or ghost effect. An example of a "bad" editing point is shown on page 10 of "What is Deinterlacing?" in which a camera cuts between fields. These "bad" editing points correspond with a disrupted 3:2 pulldown pattern. Lin recognizes that a bad editing point may only occur in two places in the 5-frame pattern of a 3:2 pulldown video: those points in which a frame may be an interlaced frame of two pictures (paragraphs 0038-0039). Lin determines these points by using the counter ModeCounter to keep track of the current video in the 3:2 pattern and checks for bad editing when ModeCounter is equal to 3 or 4; that is, those points in which an interlaced frame is composed of two fields from two different pictures. In the present invention, these points correspond with, for example, frames 1, 2, 6, 7, 11...&c. in case 0 of figure 3. When this occurs, and a bad editing point is detected, Lin

considers the 3:2 pulldown sequence to be finished (paragraph 0040). Note that unlike Wells, which deletes repeated and "orphan" fields at bad edit points (column 9: lines 49-50), Lin simply resets the detelecine process (paragraph 0030).

Regarding claim 6, Lin recognizes that bad editing points only occur in interlaced frames; that is, those with fields from separate pictures (paragraphs 0030, 0038, 0041).

Regarding claims 7, 21, and 22, Wells detects a 3:2 pulldown pattern by finding a pattern of repeat fields (column 9: lines 31-38) from images within a video capture buffer (column 9: lines 14-15). The filtering of Wells improves the 3:2 pulldown pattern detection by removing the vertical component of a difference signal between two fields (column 10: lines 4-13). Then, the pulldown detection of Wells corresponds with determining whether a pattern is a "legitimate 3:2 pulldown pattern". However, Wells does not look for a pulldown pattern at specific points within the buffer.

Lin, on the other hand, recognizes that in a 3:2 pulldown pattern, a repeat field occurs in every fifth frame (paragraph 0007). A repeat field is one that is shown twice, such as fields B1 and D2 in figure 1 of the present application. Then, a ModeCounter variable is used to keep track of every fifth frame, and determine if a repeat field is present (paragraph 0008). If a repeat field is detected on a fifth frame, it is determined that a 3:2 pulldown pattern is present. If a repeat field is detected before a fifth frame, it cannot be determined if a 3:2 pulldown is present, such as at an editing point. However, if more than five frames pass before a repeat field, then it is determined that 3:2 pulldown has stopped (paragraph 11).

Wells discloses the claimed invention except for detecting a 3:2 pulldown pattern at "likely" positions. Lin teaches that it was known to use a counter to determine the most likely points for repeat fields in a 3:2 pulldown sequence. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the counter of Lin to the inverse telecine of Wells, since it has been held that combining known prior art elements according to a known method to yield predictable results involves only routine skill in the art. See *Anderson's Black Rock Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 163 USPQ 673 (1969).

Regarding claim 8, in Wells, a repeat field may be detected by a lack of motion relative to a same-parity field, corresponding with a field identity calculation, or by a lack of motion relative to an opposite parity field, corresponding with a frame correlation (column 9: lines 39-41).

Regarding claim 9, Lin calculates the field difference between two fields of the same type as a Sum of Absolute Difference (paragraphs 0009, 0032).

Regarding claim 11, Wells teaches comparing a field with an interpolated field and taking "sample differences" between the pixels of the current field and the interpolated field to determine repeat fields (column 9: lines 30-37).

Regarding claim 13, Wells discloses calculating differences between the even field and the odd field of a first picture (column 9: line 34), corresponding with "self-frame correlation", and calculating differences between the odd field of a first picture and the even field of a second picture (column 9: line 34), corresponding with "cross-

frame correlation" and "inverse cross-frame correlation". Lin teaches taking a field difference of two fields of the same type (paragraph 0018), corresponding with "first field identity" and "second field identity", and determining an editing point in a video sequence (paragraph 0020), corresponding with "new scene score".

Regarding claim 23, as previously mentioned, figure 1A of Wells illustrates that inverse telecine circuit 18 outputs to video encoder 20. The encoder may set a repeat_first_field flag in accordance with the inverse telecine (column 3: line 4).

Regarding claim 24, as previously mentioned, Lin is concerned with finding "bad editing points", in which a single frame is produced from fields of different scenes, producing a double-exposed or ghost effect. An example of a "bad" editing point is shown on page 10 of "What is Deinterlacing?" in which a camera cuts between fields. These "bad" editing points correspond with a disrupted 3:2 pulldown pattern. Lin recognizes that a bad editing point may only occur in two places in the 5-frame pattern of a 3:2 pulldown video: those points in which a frame may be an interlaced frame of two pictures (paragraphs 0038-0039). In the present invention, these points correspond with, for example, frames 1, 2, 6, 7, 11...&c. in case 0 of figure 3. When this occurs, and a bad editing point is detected, Lin considers the 3:2 pulldown sequence to be finished (paragraph 0040). Note that unlike Wells, which deletes repeated and "orphan" fields at bad edit points (column 9: lines 49-50); Lin simply resets the detelecine process (paragraph 0030).

11. Claims 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wells in view of Lin as applied to claim 8 above, and further in view of *Motion Estimation Algorithms for Video Compression* (Furht et al.). Claims 10 and 12 are directed to calculating the difference between two fields according to a squared error calculation. However, Wells merely teaches calculating "sample differences" (column 9: lines 33-39) between fields, and Lin teaches a Sum of Absolute Difference calculation between fields (paragraph 0010).

Furht et al. discusses various cost-function strategies for determining the differences between two pictures. Regarding claims 10 and 12, Fuhrt et al. shows that the Mean-Squared Difference function is known in the art for determining the closeness of two spaces. One having ordinary skill in the art at the time the invention was made would appreciate that the specific example given can be generalized over two whole pictures by letting search area (m,n) be the entire picture, setting F and G to be the two fields to be compared, and setting motion vector (dx, dy) to zero.

Wells, in combination with Lin, discloses the claimed invention except for comparing two pictures with a squared error function. Furht et al. teaches the use of the squared difference cost function in picture comparison. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to determine the similarity between two pictures by a Squared Difference function, as taught by Furht et al., since Furht et al. states in page 58, paragraph 8, that such a modification would produce more accurate results than other cost functions such as the Mean Absolute Difference.

12. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wells in view of US Patent 6,525,774 B1 (Sugihara). Claim 4 is directed to supplying an MPEG-2 encoder with a picture_structure flag, a progressive_frame field flag, and a repeat_first_field flag. Wells discloses applying a repeat_first_field flag in response to an inverse telecine (column 3: line 7), but not a picture_structure flag or a progressive_frame.

Sugihara teaches an inverse telecine system. Figure 10 shows a state machine that illustrates the operation of Sugihara. Regarding claim 4, in Sugihara, a "judgment frame" is constructed from to consecutive fields, and determined if the frame should be coded as a "field structure" or a "flag structure" (column 7: lines 50-63). If the frame has a "field structure", then the appropriate Top Field First (TFF) or Bottom Field First (BFF) flag is added (column 7: lines 55-58). The Repeat Field Flag (RFF) flag may also be added appropriately (column 8: line 17). Since Sugihara operates on a DVD recorder (column 1: line 51–column 2: line 11), and the DVD standard was known to incorporate MPEG-2 video, it is inherent that these flags are MPEG-2 flags.

Sugihara does not explicitly teach setting a progressive_frame field flag. However, as shown in "MPEG-2 FAQ" (Fogg), in the MPEG-2 format, the picture_structure frame is only valid for interlaced frames, that is, those with the progressive_frame flag set to zero (pp. 17-20). Therefore, since Sugihara sets a field structure flag, it is inherent that it sets the MPEG-2 progressive_frame flag to zero for every frame.

Wells discloses the claimed invention except for setting a plurality of MPEG-2 flags. Sugihara teaches that it was known to incorporate means for determining MPEG-2 flags in an inverse telecine system. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the inverse telecine of Wells to set "appendant flags" according to a judgment frame, as taught by Sugihara, since Sugihara states in column 3: lines 6-59 that such a modification would increase the accuracy of field information determination in a picture sequence with high noise or low motion.

13. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wells in view of Lin as applied to claim 8 above, and further in view of US Patent 5,821,991 A (Kwok) and US Patent 6,449,015 B1 (Sugaya). Claims 14 and 15 are directed to calculating a plurality of metrics for determining the presence of a 3:2 pulldown. Wells teaches comparing the amount of inter-field motion between a current field and a previous and subsequent opposite-parity field (column 9: lines 42-44). This corresponds with the claimed "cross frame correlation score". However, Wells does not teach the other metrics: the field identity ratios and the triangle scores.

Kwok teaches an inverse telecine system. Regarding claims 14 and 15, the inverse telecine system of Kwok searches for a frame/field pattern that matches one of the five possible 3:2 phases illustrated in figure 5B. Note that the "downward" triangle ∇ having a top-bottom-top structure corresponds with the "left triangle" of the present invention, and the "upward" triangle Δ having a bottom-top-bottom structure

corresponds with the "right triangle" of the present invention. The 3:2 phase search is performed recursively. If the system of Kwok cannot find a single phase for a video sequence, it determines that an edit has occurred, and after identifying the edit point, searches again before and after the point (column 7: lines 36-63). The phase search determines a correlation metric between the current sequence and the five phases to determine the dominant phase. (column 8: lines 12-30). This phase search function, and phase correlation metric, by matching the current video sequence with a known 3:2 pulldown pattern, corresponds with the claimed "left triangle score", "right triangle score", or "double triangle score".

Wells, in combination with Lin, discloses a majority of the claimed invention except for determining a 3:2 pulldown pattern based on comparing a given video sequence with a 3:2 template. Kwok teaches that it was known to determine if a video sequence contains a 3:2 pulldown pattern by comparing it with the five possible 3:2 phases. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a phase fitter into an inverse telecine system, as taught by Kwok, since Kwok states in column 3: lines 1-12 that such a modification would increase accuracy of determining two-field frames, three-field frames, and repeat frames in a video sequence with a changing 3:2 pulldown pattern over conventional methods. However, Kwok does not teach the limitation of determining field identity ratios.

Sugaya teaches an apparatus for detecting redundant pictures. Regarding claims 14 and 15, the invention of Sugaya performs a method of "calculating difference

information indicating a difference between a unit picture and a subsequent unit picture **having an identical phase** for each of the unit pictures; multiplying the difference information of a unit picture preceding an object unit picture by a predetermined first constant to produce a **preceding difference information** and for multiplying the difference information of a unit picture following the object unit picture by the first constant to produce a **following difference information**, the first constant being greater than zero and smaller than 1; and **judging that the unit picture is a redundant picture** if the difference information of the object information is smaller than both the preceding difference information and the following difference information" (emphasis added) (column 3: lines 1-13). This corresponds with the claimed "first field identity ratio" if the "unit picture" of Sugaya is a top field, and the claimed "second field identity ratio" if the "unit picture" of Sugaya is a bottom field.

Wells, in combination with Lin and Kwok, discloses the claimed invention except for determining a 3:2 pulldown pattern by comparing a field of a picture with preceding and subsequent fields of the same polarity as the current field. Sugaya teaches that it was known to compare a picture with the surrounding two pictures of the same phase to determine if the picture was redundant. Therefore, it would have been obvious to one having ordinary skill in the art to incorporate a unit picture comparison system to an inverse telecine system, as taught by Sugaya, since Sugaya states in column 2: lines 25-48 that such a modification would increase the accuracy of determining redundant pictures in a noisy video signal.

14. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wells in view of Lin as applied to claim 7 above, and further in view of US Patent 6,724,433 B1 (Lippman). Claim 16 is directed to computing at least one of several metrics for confirming whether a 3:2 pulldown pattern has been detected. Wells and Lin do not disclose this feature.

Lippman teaches an automated inverse telecine system. Regarding claim 16, the inverse telecine of Lippman maintains a history of field comparisons. Figure 13 illustrates the operation of one embodiment of Lippman. At step 1306, a current field is compared with the previous field having the same polarity. These comparisons are stored (column 24: lines 29-49). Continuing, at step 1314, a loop is performed to compare the most recent difference calculation at step 1306 with a plurality of previously calculated differences to extract a 3:2 pulldown pattern (column 25: lines 16-52). These comparisons of a current difference with historical differences correspond with the calculation of a "first field identity ratio 2" if the current field is a top field or a "second field identity ratio 2" if the current field is a bottom field. Regarding claim 17, the previously calculated, stored difference corresponds with a "field identity ratio of a second subsequent frame".

Wells, in combination with Lin, discloses the claimed invention except for comparing field identities for a plurality of frames. Lippman teaches that it was known to perform a comparison of same-polarity fields, and to reference this comparison for further calculations in an inverse telecine. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a field

comparison loop in an inverse telecine system, as taught by Lippman, since Lippman states in column 25: lines 16-22 that such a modification would increase the accuracy of telecine pattern detection in a relatively still or motionless video sequence.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patents 5,134,480 A (Wang et al.), 5,929,902 A (Kwok), 6,115,499 A (Wang et al.), and US Patent 7,154,555 B2 (Conklin) teach additional inverse telecine systems.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571) 272-9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri, can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only.

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